Listing of Claims

1. (currently amended) In a computing device that implements a video encoder, a method comprising:

with the computing device that implements the video encoder, encoding one or more video images, including processing run-level information in a two-layer representation for a sequence of values for the one or more video images, wherein the processing includes:

run-level encoding the sequence of values as a sequence of plural first-layer run-level pairs that include plural first-layer runs and plural first-layer levels; and

run-level encoding a sequence of the plural first-layer runs ~~from the sequence of values~~ as a sequence of one or more second-layer run-level pairs, wherein each of the one or more second-layer run-level pairs includes a ~~one or more~~ second-layer run[[s]] and a ~~one or more~~ second-layer level[[s]], the second-layer run representing a count of consecutive first-layer runs classified as having an insignificant run value, and the second-layer level representing a single adjacent first-layer run classified as having a significant run value; and

from the computing device that implements the video encoder, outputting a result of the encoding the one or more video images.

2. - 3. (cancelled)

4. (original) The method of claim 1 wherein the values are frequency transform coefficients.

5. (previously presented) The method of claim 4 wherein the sequence of values is zigzag scanned using a scan pattern selected from among plural available scan patterns for variable-size blocks.

6. (cancelled)

7. (previously presented) The method of claim 1 wherein each of the plural first-layer runs represents a run of zero or more zero values in the sequence of values.

8. (currently amended) The method of claim 1 wherein ~~each of the one or more second-layer runs represents a run of zero or more insignificant value first-layer runs~~ the count of consecutive first-layer runs is a count of first-layer runs with run value of zero.

9. (currently amended) The method of claim 1 wherein ~~each of the one or more second-layer levels represents a~~ the single first-layer run with the significant run value has a run value higher than zero.

10. (currently amended) The method of claim 1 further including processing ~~at least some of the one or more~~ the second-layer run[[s]] using a separate Huffman code per second-layer run.

11. (currently amended) The method of claim 1 further including processing ~~at least some of the one or more~~ the second-layer level[[s]] using a separate Huffman code per second-layer level.

12. (currently amended) The method of claim 1 further including processing a count of significant second-layer runs, wherein the count of significant second-layer runs at least in part enables reduction in code table size and/or early termination of decoding.

13. (cancelled)

14. (previously presented) The method of claim 68 wherein each of the plural first-layer levels represents a non-zero value in the sequence of values.

15. (currently amended) The method of claim 68 wherein ~~each of the one or more second-layer runs represents a run of zero or more insignificant value first-layer levels~~ the count of consecutive first-layer levels is a count of first-layer levels with an absolute value of one.

16. (currently amended) The method of claim 68 wherein ~~each of the one or more second-layer levels represents a~~ the single ~~significant value~~ first-layer level with the significant level value has an absolute value of two or more.

17. (currently amended) The method of claim 68 further including processing ~~at least some of the one or more~~ the second-layer run[[s]] using a separate Huffman code per second-layer run.

18. (currently amended) The method of claim 68 further including processing ~~at least some of the one or more~~ the second-layer level[[s]] using a separate Huffman code per second-layer level.

19. (currently amended) The method of claim 68 further including processing a count of significant second-layer levels, wherein the count of significant second-layer levels at least in part enables reduction in code table size and/or early termination of decoding.

20. (currently amended) The method of claim 1 wherein the processing includes using embedded Huffman code tables for the information in the ~~multi-level~~ two-layer representation, and wherein the embedded Huffman code tables are shared for plural different variable-size blocks.

21. (currently amended) The method of claim 1 wherein the processing includes using zoned Huffman code tables for the information in the ~~multi-level~~ two-layer representation.

22. (currently amended) In a computing device that implements a video decoder, a method comprising:

with the computing device that implements the video decoder, decoding one or more video images, including, for each of plural sequences of frequency transform coefficients for the one or more video images, processing run-level information for the sequence in a two-layer representation, including:

run-level decoding a sequence of one or more second-layer run-level pairs that represent a sequence of plural first-layer runs, wherein each of the one or more second-layer run-level pairs includes a ~~one or more~~ second-layer run[[s]] and a ~~one or more~~ second-layer levels ~~that represent one or more first-layer runs~~, the second-layer run representing a count of consecutive first-layer runs classified as having an insignificant run value, and the second-layer level representing a single adjacent first-layer run classified as having a significant run value; and

run-level decoding the plural first-layer runs and plural first-layer levels to reconstruct ~~for~~ the sequence of frequency transform coefficients; and

from the computing device that implements the video decoder, outputting a result of the decoding the one or more video images.

23.-24. (cancelled)

25. (currently amended) The method of claim 22 wherein each of the ~~one or more~~ plural first-layer runs represents a run of zero or more zero values in the sequence.

26. (currently amended) The method of claim 22 wherein ~~each of the one or more second-layer runs represents a run of zero or more zero-value first-layer runs~~ the count of consecutive first-layer runs is a count of first-layer runs with run value of zero.

27. (currently amended) The method of claim 22 wherein ~~each of the one or more second-layer levels represents a single non-zero value first-layer run~~ the single first-layer run with the significant run value has a run value higher than zero.

28. (currently amended) In a computing device that implements a video encoder, a method comprising:

with the computing device that implements the video encoder, encoding one or more video images, including, for each of plural sequences of frequency transform coefficients for the one or more video images, processing run-level information for the sequence in a two-layer representation, including:

run-level encoding the sequence of frequency transform coefficients as a sequence of plural first-layer run-level pairs that include plural first-layer runs and plural first-layer levels; and

run-level encoding a sequence of the plural ~~one or more~~ first-layer levels as a sequence of one or more second-layer run-level pairs, wherein each of the one or more second-layer run-level pairs includes a ~~one or more~~ second-layer run[[s]] and a ~~one or more~~ second-layer level[[s]], the second-layer run representing a count of consecutive first-layer levels classified as having an insignificant level value, and the second-layer level representing a single adjacent first-layer level classified as having a significant level value; and

from the computing device that implements the video encoder, outputting a result of the encoding the one or more video images.

29. - 30. (cancelled)

31. (currently amended) The method of claim 28 wherein each of the ~~one or more~~ plural first-layer levels represents a non-zero value in the sequence.

32. (currently amended) The method of claim 28 wherein ~~each of the one or more second-layer runs represents a run of zero or more first-layer levels having an absolute value of one~~ the count of consecutive first-layer levels is a count of first-layer levels with an absolute value of one.

33. (currently amended) The method of claim 28 wherein ~~each of the one or more second-layer levels represents a single first-layer level having an absolute value of two or more~~ the single first-layer level with the significant level value has an absolute value of two or more.

34. - 67. (canceled)

68. (currently amended) In a computing device that implements a video decoder, a method comprising:

with the computing device that implements the video decoder, decoding one or more video images, including processing run-level information in a two-layer representation for a sequence of values for the one or more video images, wherein the processing includes:

run-level decoding a sequence of one or more second-layer run-level pairs that represent a sequence of plural first-layer levels, wherein each of the one or more second-layer run-level pairs includes a ~~one or more~~ second-layer run[[s]] and a ~~one or more~~ second-layer level[[s]] ~~representing plural first-layer levels~~, the second-layer run representing a count of consecutive first-layer levels classified as having an insignificant level value, and the second-layer level representing a single adjacent first-layer level classified as having a significant level value; and

run-level decoding plural first-layer runs and the plural first-layer levels to reconstruct ~~for~~ the sequence of values; and

from the computing device that implements the video decoder, outputting a result of the decoding the one or more video images.

69. (currently amended) The method of claim 1 wherein the outputting the result comprises signaling the encoded run-level information as part of a bit stream.

70. - 71. (cancelled)

72. (currently amended) The method of claim 22 wherein the outputting the result comprises outputting for display one or more video pictures reconstructed based at least in part upon the ~~one or more first-layer runs~~ plural sequences of frequency transform coefficients.

73. (currently amended) The method of claim 28 wherein the outputting the result comprises signaling encoded run-level information as part of a bit stream.

74. - 75. (cancelled)

76. (currently amended) The method of claim 68 wherein the outputting the result comprises outputting for display one or more video pictures reconstructed based at least in part upon the ~~plural first-layer levels~~ sequence of values.

77. (currently amended) One or more computer-readable ~~physical~~ memory storage media storing computer-executable instructions for causing a computing device implementing a video encoder programmed thereby to perform a method for encoding video, the method comprising:

with the computing device that implements the video encoder, encoding one or more video images, including processing run-level information in a two-layer representation for a sequence of values for the one or more video images, wherein the processing includes:

run-level encoding the sequence of values as a sequence of plural first-layer run-level pairs that include plural first-layer runs and plural first-layer levels; and

run-level encoding a sequence of the plural first-layer runs ~~from the sequence of values~~ as a sequence of one or more second-layer run-level pairs, wherein each of the one or more second-layer run-level pairs includes a second-layer run[[s]] and a ~~one or more~~ second-layer level[[s]], the second-layer run representing a count of consecutive first-layer runs classified as having an insignificant run value, and the second-layer level representing a single adjacent first-layer run classified as having a significant run value; and

from the computing device that implements the video encoder, outputting a result of the encoding the one or more video images.

78. (currently amended) The computer-readable ~~physical~~ memory storage media of claim 77 wherein each of the plural first-layer runs represents a run of zero or more zero values in the sequence of values.

79. (currently amended) The computer-readable ~~physical~~ memory storage media of claim 77 wherein ~~each of the one or more second-layer runs represents a run of zero or more insignificant-value first-layer runs~~ the count of consecutive first-layer runs is a count of first-layer runs with run value of zero.

80. (currently amended) The computer-readable ~~physical~~ memory storage media of claim 77 wherein ~~each of the one or more second-layer levels represents a~~ the single ~~significant value~~ first-layer run with the significant run value has a run value higher than zero.

81. (currently amended) The computer-readable ~~physical~~ memory storage media of claim 77 wherein the method further includes processing the ~~at least some of the one or more~~ second-layer run[[s]] using a separate Huffman code per second-layer run.

82. (currently amended) The computer-readable ~~physical~~ memory storage media of claim 77 wherein the method further includes processing the ~~at least some of the one or more~~ second-layer level[[s]] using a separate Huffman code per second-layer level.

83. (currently amended) The computer-readable ~~physical~~ memory storage media of claim 77 wherein the method further includes processing a count of significant second-layer runs, wherein the count of significant second-layer runs at least in part enables reduction in code table size and/or early termination of decoding.

84. (currently amended) One or more computer-readable ~~physical~~ memory storage media ~~containing~~ storing computer-executable instructions for causing a computing device that implements a video decoder programmed thereby to perform a method for decoding video, the method comprising:

with the computing device that implements the video decoder, decoding one or more video images, including, for each of plural sequences of frequency transform coefficients for the one or more video images, processing run-level information for the sequence in a two-layer representation, including:

run-level decoding a sequence of one or more second-layer run-level pairs that represent a sequence of plural first-layer runs, wherein each of the one or more second-layer run-level pairs includes a ~~one or more~~ second-layer run[[s]] and a ~~one or more~~ second-layer levels ~~representing one or more first-layer runs~~, the second-layer run representing a count of consecutive first-layer runs classified as having an insignificant run value, and the second-layer

level representing a single adjacent first-layer run classified as having a significant run value; and

run-level decoding the plural first-layer runs and plural first-layer levels to reconstruct ~~for~~ the sequence of frequency transform coefficients; and

from the computing device that implements the video decoder, outputting a result of the decoding the one or more video images.

85. (currently amended) The computer-readable ~~physical~~ memory storage media of claim 84 wherein each of the ~~one or more~~ plural first-layer runs represents a run of zero or more zero values in the sequence.

86. (currently amended) The computer-readable ~~physical~~ memory storage media of claim 84 wherein ~~each of the one or more second layer runs represents a run of zero or more zero value first layer runs~~ the count of consecutive first-layer runs is a count of first-layer runs with run value of zero.

87. (currently amended) The computer-readable ~~physical~~ memory storage media of claim 84 wherein ~~each of the one or more second layer levels represents a single non zero value first layer run~~ the single first-layer run with the significant run value run has a run value higher than zero.

88. (currently amended) One or more computer-readable ~~physical~~ memory storage media storing computer-executable instructions for causing a computing device that implements a video encoder programmed thereby to perform a method for encoding video, the method comprising:

with the computing device that implements the video encoder, encoding one or more video images, including, for each of plural sequences of frequency transform coefficients for the one or more video images, processing run-level information for the sequence in a two-layer representation, including:

run-level encoding the sequence of frequency transform coefficients as a sequence of plural first-layer run-level pairs that include plural first-layer runs and plural first-layer levels; and

run-level encoding a sequence of the plural ~~one or more~~ first-layer levels as a sequence of one or more second-layer run-level pairs, wherein each of the one or more second-layer run-level pairs includes a ~~one or more~~ second-layer run[[s]] and a ~~one or more~~ second-layer level[[s]], the second-layer run representing a count of consecutive first-layer levels classified as having an insignificant level value, and the second-layer level representing a single adjacent first-layer level classified as having a significant level value; and

from the computing device that implements the video encoder, outputting a result of the encoding the one or more video images.

89. (currently amended) The computer-readable ~~physical~~ memory storage media of claim 88 wherein each of the ~~one or more~~ plural first-layer levels represents a non-zero value in the sequence.

90. (currently amended) The computer-readable ~~physical~~ memory storage media of claim 88 wherein ~~each of the one or more second layer runs represents a run of zero or more first layer levels having an absolute value of one~~ the count of consecutive first-layer levels is a count of first-layer levels with an absolute value of one.

91. (currently amended) The computer-readable ~~physical~~ memory storage media of claim 88 wherein ~~each of the one or more second layer levels represents a single first layer level having an absolute value of two or more~~ the single first-layer level with the significant level value has an absolute value of two or more.

92. (currently amended) One or more computer-readable ~~physical~~ memory storage media storing computer-executable instructions for causing a computing device that implements a video decoder programmed thereby to perform a method for decoding video, the method comprising:

with the computing device that implements the video decoder, decoding one or more video images, including processing run-level information in a two-layer representation for a sequence of values for the one or more video images, wherein the processing includes:

run-level decoding a sequence of one or more second-layer run-level pairs that represent a sequence of plural first-layer levels, wherein each of the one or more second-layer run-level pairs includes a ~~one or more~~ second-layer run[[s]] and a ~~one or more~~ second-layer level[[s]] ~~representing plural first-layer levels~~, the second-layer run representing a count of consecutive first-layer levels classified as having an insignificant level value, and the second-layer level representing a single adjacent first-layer level classified as having a significant level value; and

run-level decoding plural first-layer runs and the plural first-layer levels to reconstruct ~~for~~ the sequence of values; and

from the computing device that implements the video decoder, outputting a result of the decoding the one or more video images.

93. (currently amended) The computer-readable ~~physical~~ memory storage media of claim 92 wherein each of the plural first-layer levels represents a non-zero value in the sequence of values.

94. (currently amended) The computer-readable ~~physical~~ memory storage media of claim 92 wherein ~~each of the one or more second-layer runs represents a run of zero or more insignificant value first-layer levels~~ the count of consecutive first-layer levels is a count of first-layer levels with an absolute value of one.

95. (currently amended) The computer-readable ~~physical~~ memory storage media of claim 92 wherein ~~each of the one or more second-layer levels represents a~~ the single ~~significant value~~ first-layer level with the significant level value has an absolute value of two or more.

96. (currently amended) The computer-readable ~~physical~~ memory storage media of claim 92 wherein the method further includes processing ~~at least some of the one or more~~ the second-layer run[[s]] using a separate Huffman code per second-layer run.

97. (currently amended) The computer-readable ~~physical~~ memory storage media of claim 92 wherein the method further includes processing ~~at least some of the one or more~~ the second-layer level[[s]] using a separate Huffman code per second-layer level.

98. (currently amended) The computer-readable ~~physical~~ memory storage media of claim 92 wherein the method further includes processing a count of significant second-layer levels, wherein the count of significant second-layer levels at least in part enables reduction in code table size and/or early termination of decoding.